

## Revision of the subgenus *Marmaraeschna* (Odonata: Aeshnidae)

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### Abstract

This revision of the subgenus *Marmaraeschna* includes the description of three new species: *Aeshna* (*M.*) *fissifrons*, *A.* (*M.*) *obscura* and *A.* (*M.*) *brevicercia*, as well as redescrptions of the previously known species, including the first description of the male of *A.* (*M.*) *pallipes*, a key for males and females and an updated distribution for each species. Useful characters are the presence or absence of black stripes over frontoclypeal and fronto-ocular grooves, T-spot shape, abdominal colour pattern, ventral terga contour and cerci shape.

### Introduction

The neotropical subgenus *Marmaraeschna* Calvert was erected in 1952 to receive *Aeshna brevifrons* Hagen, *A. intricata* Martin and *A. vigintipunctata* Ris. The characters proposed for this subgenus were: pterothoracic marbled colour pattern, abdominal segment (S) 1 with a ventral tubercle, supratrangular crossveins present, vein IR1 beginning proximal to the level of the pterostigma or under the proximal end or proximal half of the pterostigma, anal triangle 3-celled, male with a middorsal longitudinal carina on S10 and male cerci with the apex not bifid nor with an anteapical ventral point. Some years later a fourth species, *A. pallipes* Fraser, was added (Calvert 1956). Up to now, the taxonomic situation of this subgenus has been very confusing, due to the few specimens collected, the poor preservation of the type material, the vague original descriptions and several misidentifications in the only previous revision of this group (Calvert 1956).

*Marmaraeschna* species are distributed mainly in the Andes, approximately from 400 to 4,000 m. They are found in lotic environments of the Andean mountain range, from Venezuela in the north to 33°S in Argentina and Chile, and in the central Argentine hills, with Sierra de La Ventana (38°S), Buenos Aires province, their southernmost known locality. The record of *A. brevifrons* from Mexico (Hagen 1861) and those of *A. intricata* from Mexico and Brazil (Martin 1908) are here considered erroneously assigned to those countries (see distribution of each species).

The goal of this work is to clarify the confusing taxonomic situation by means of introducing new specific characters, redescribing available type material, re-examining most of the collected specimens and elaborating a specific key.

## Material and methods

Examined specimens are deposited at the following collections:

- ANSP – The Academy of Natural Science, Philadelphia, PA., USA
- DRP – Dr. Dennis R. Paulson private collection, Washington, USA
- FML – Fundación e Instituto Miguel Lillo, Tucumán, Argentina
- FSCA – Florida State Collection of Arthropods, Gainesville, USA
- IADIZA – Instituto de Investigaciones de Zonas Áridas, Mendoza, Argentina
- IEUM – Instituto de Entomología, Universidad Metropolitana de Ciencias de la Educación, Santiago, Chile.
- IZA – Instituto de Zoología Agrícola, Maracay, Venezuela
- MACN – Museo Argentino de Ciencias Naturales “Bernardino Rivadavia”, Buenos Aires, Argentina
- MCZ – Museum of Comparative Zoology, Harvard, USA
- MHNS – Museo Nacional de Historia Natural de Santiago, Chile
- MLP – Departamento Científico Entomología, Museo de La Plata, La Plata, Argentina
- MNB – Humboldt–Universität, Museum für Naturkunde, Institut für Systematische Zoologie, Berlin, Germany
- PUC – Departamento de Biología, Pontificia Universidad Católica, Quito, Ecuador
- RWG – Dr. Rosser W. Garrison private collection, California, USA
- UMMZ – University of Michigan, Museum of Zoology, M.I., USA
- USNM – U.S. National Museum, Washington D.C., USA
- WB – Dr. Wilfried Braun private collection, Berlin, Germany

### *Type material studied*

Holotype female of *Aeshna (Marmaraeschna) pallipes* and, by present designation, lectotype male and paralectotype female of *A. (M.) brevifrons*.

### *Synonymic lists*

For each species a synonymic list is given, including all corroborated previous records (by means of specimen re-examinations or drawing comparisons). For the records that have not been corroborated, a second synonymic list is given. Regarding the specimens studied by Calvert (1956), only those examined in the present work and those that have been redetermined based on the drawings and/or descriptions of Calvert are included. In the lists of material the following symbols regarding the specimens studied and/or mentioned by previous workers are used: \* = specimen recorded by Calvert (1956); + = specimen illustrated by Calvert (1956); \*\* = specimen recorded by Fraser (1947);

I = specimen recorded by De Marmels (1988); II = specimen recorded and illustrated by De Marmels (1988); III = specimen recorded by Schmidt (1952).

### *Descriptions*

For each new species complete descriptions of holotype and allotype are given. Paratypes variations are given in square brackets. Previously known species are briefly redescribed, except for the male of *Aeshna pallipes* Fraser, described herein for the first time.

### *Characters examined*

**Head:** T-spot shape, development of black stripes on fronto-ocular and fronto-clypeal grooves and frontal ridge shape. **Thorax:** colour pattern and wing venation. **Abdomen:** colour pattern, ventral terga contour, cerci overall shape and subbasal tooth and dorsal ridge development. Male genitalia were examined for each species, but we did not found any useful and consistent character. Holotype and allotype measurements are included in their descriptions; range, mean and standard deviation for each species as well as wing venation characters are included in Tables 1 and 2. Drawings were made using a net reticule.

Distribution area is based only on the examined material and corroborated records.

### *Aeshna (Marmaraeschna)*

(Figs 1-2)

Of the six diagnostic characters proposed by Calvert (1952, 1956) for the subgenus *Marmaraeschna*, the only exclusive one is the pterothoracic marbled colour pattern, which is composed of black spots and stripes over pale areas. The black stripes are located along the ventral margin of mesepimeron, metepisternum and metepimeron, and along the ventro-dorsal grooves. This pattern can be organised and described as follows (Fig. 1):

- 1: At dorsal 0.75 of mesanepisternum, next to mesanepisternum-mesepimeron groove.
- 2: At dorsal 0.60 of mesepimeron, approximately halfway between mesanepisternum-mesepimeron and mesepimeron-metepisternum grooves.
- 3: At dorsal 0.75 of mesepimeron, at the level of mesepimeron-metepisternum groove.
- 4: At 0.50 over mesepimeron-metepisternum groove.
- 5: At dorsal 0.60 of metepisternum, approximately halfway between mesepimeron-metepisternum and metepisternum-metepimeron grooves.
- 6: At dorsal 0.75 of metepisternum, next to metepisternum-metepimeron groove.
- 7: At dorsal 0.60 of metepimeron, next to metepisternum-metepimeron groove.
- 8: At ventral 0.40 of metepimeron, halfway between metepisternum-metepimeron groove and posterior margin of metepimeron.

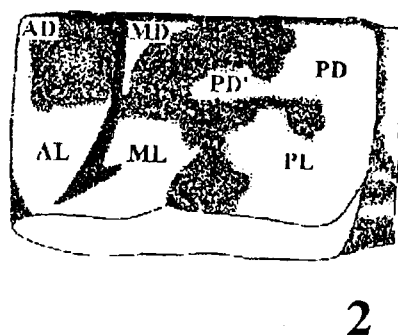
Spots 2 and 3 are usually confluent, as well as 5 and 6, and 4 is usually confluent with the black stripe located over mesepimeron-metepisternum groove.

Table 1. *Marmaraeschna* species measurements (mm): range, mean and standard deviation; number of specimens (*n*).

	Head maximum width		Head maximum width/ frons width		Cerci length		Cerci maximum width		♂ Epiproct length	♂ Epiproct length/ cerci length
	♂	♀	♂	♀	♂	♀	♂	♀		
<i>A. (M.) brevicercia</i>	8.9 - 10 9.53 ± 0.24 <i>n</i> = 18	9.5 - 10.2 9.88 ± 0.31 <i>n</i> = 6	1.9 - 2.8 2.22 ± 0.22 <i>n</i> = 18	1.9 - 2.3 2.12 ± 0.12 <i>n</i> = 6	5.4 - 5.9 5.57 ± 0.18 <i>n</i> = 17	2.7 - 3 2.8 ± 0.13 <i>n</i> = 6	0.7 - 1 0.87 ± 0.09 <i>n</i> = 17	0.55 - 0.7 0.62 ± 0.06 <i>n</i> = 6	2 - 2.7 2.34 ± 0.17 <i>n</i> = 18	0.38 - 0.46 0.42 ± 0.03 <i>n</i> = 17
<i>A. (M.) brevifrons</i>	8.6 - 9.1 8.93 ± 0.16 <i>n</i> = 8	8.7 - 9.5 9.11 ± 0.27 <i>n</i> = 6	1.5 - 1.7 1.67 ± 0.15 <i>n</i> = 8	1.5 - 1.9 1.7 ± 0.16 <i>n</i> = 6	4.2 - 4.8 4.47 ± 0.31 <i>n</i> = 7	1.9 - 2.3 2.03 ± 0.15 <i>n</i> = 6	0.6 - 1.0 0.79 ± 0.11 <i>n</i> = 7	0.5 — <i>n</i> = 6	2 - 2.65 2.39 ± 0.2 <i>n</i> = 8	0.47 - 0.6 0.53 ± 0.05 <i>n</i> = 7
<i>A. (M.) fassifrons</i>	8.4 - 9.4 8.72 ± 0.4 <i>n</i> = 4	8.2 - 9.6 8.97 ± 0.45 <i>n</i> = 8	1.7 - 2.1 1.82 ± 0.16 <i>n</i> = 4	1.6 - 1.8 1.72 ± 0.08 <i>n</i> = 8	3.5 - 4.5 3.95 ± 0.36 <i>n</i> = 4	1.7 - 2.2 1.91 ± 0.17 <i>n</i> = 8	0.6 - 0.7 0.65 ± 0.05 <i>n</i> = 4	0.45 - 0.6 0.52 ± 0.05 <i>n</i> = 7	2 - 2.6 2.27 ± 0.24 <i>n</i> = 4	0.52 - 0.65 0.57 ± 0.06 <i>n</i> = 4
<i>A. (M.) intricata</i>	9 - 9.45 9.28 ± 0.25 <i>n</i> = 3	9.2 - 9.5 9.38 ± 0.16 <i>n</i> = 3	1.9 - 2.4 2.16 ± 0.25 <i>n</i> = 3	1.7 - 2 1.86 ± 0.15 <i>n</i> = 3	4.9 - 5.5 5.16 ± 0.3 <i>n</i> = 3	3.7 — <i>n</i> = 1	0.8 - 0.85 0.8 ± 0.03 <i>n</i> = 3	0.8 — <i>n</i> = 2	1.9 - 2.4 2.23 ± 0.28 <i>n</i> = 3	0.37 - 0.49 0.43 ± 0.06 <i>n</i> = 3
<i>A. (M.) obscura</i>	10 - 10.6 10.22 ± 0.2 <i>n</i> = 6	10.4 - 10.7 10.5 ± 0.21 <i>n</i> = 2	2.2 - 2.5 2.31 ± 0.11 <i>n</i> = 6	2.2 - 2.5 2.35 ± 0.21 <i>n</i> = 2	5.8 - 6.5 6.03 ± 0.24 <i>n</i> = 6	5.6 - 6 5.8 ± 0.28 <i>n</i> = 2	1 - 1.25 1.1 ± 0.1 <i>n</i> = 6	1.4 — <i>n</i> = 2	2 - 3 2.46 ± 0.32 <i>n</i> = 6	0.34 - 0.46 0.4 ± 0.04 <i>n</i> = 6
<i>A. (M.) pallipes</i>	8.7 - 9.6 9.16 ± 0.37 <i>n</i> = 7	8.7 - 10.4 9.32 ± 0.42 <i>n</i> = 24	2 - 2.5 2.16 ± 0.18 <i>n</i> = 7	1.7 - 2.4 2.09 ± 0.2 <i>n</i> = 2	4.1 - 4.65 4.31 ± 0.17 <i>n</i> = 7	1.8 - 2.2 1.98 ± 0.13 <i>n</i> = 2	0.7 - 0.8 0.75 ± 0.04 <i>n</i> = 7	0.5 - 0.9 0.6 ± 0.1 <i>n</i> = 26	2.1 - 3 2.38 ± 0.3 <i>n</i> = 7	0.49 - 0.65 0.55 ± 0.05 <i>n</i> = 7
<i>A. (M.) vigintipunctata</i>	9.4 - 10.3 9.75 ± 0.27 <i>n</i> = 14	9.4 - 9.9 9.63 ± 0.2 <i>n</i> = 6	2 - 2.7 2.38 ± 0.15 <i>n</i> = 14	1.9 - 2.35 2.17 ± 0.17 <i>n</i> = 6	5.8 - 6.4 6.1 ± 0.22 <i>n</i> = 12	4.9 - 5.65 5.34 ± 0.35 <i>n</i> = 6	0.8 - 1.1 0.97 ± 0.08 <i>n</i> = 12	1 - 1.2 1.13 ± 0.08 <i>n</i> = 6	2.6 - 3.2 2.87 ± 0.18 <i>n</i> = 13	0.43 - 0.53 0.46 ± 0.09 <i>n</i> = 12

Table 2. *Marmaraeschna* species wing characters. Fw: fore wing; Hw: hind wing; Ax: antenodal crossveins; trg.: triangle; suptr.: supratriangle; cub: cubital space; fork cells: number of cells of IR2 fork at pterostigma level; crossv.: crossveins, br.: bridge; pt: pterostigma.

	<i>A. (M.) brevicercia</i> <i>n</i> = 24	<i>A. (M.) brevifrons</i> <i>n</i> = 14	<i>A. (M.) fissifrons</i> <i>n</i> = 12	<i>A. (M.) intricata</i> <i>n</i> = 6	<i>A. (M.) obscura</i> <i>n</i> = 8	<i>A. (M.) pallipes</i> <i>n</i> = 31	<i>A. (M.) viginipunctata</i> <i>n</i> = 20
Fw Ax	13-16	12-14	11-14	13-16	13-17	11-15	12-15
Fw trg. cells	3-5	2-4	4-5	4-5	4-5	4-5	4-5
Fw suptr. crossv.	1-3	1-2	0-2	1-3	2-3	0-2	2-3
Fw cub. crossv.	4-7	4-6	4-6	5-6	5-7	4-6	4-6
Fw fork cells	3-4	2-3	2-3	3	3-4	2-4	2-4
Fw br. crossv.	2-4	2-3	2-4	2-3	2-5	2-4	2-3
Hw Ax	8-10	7-9	7-10	8-9	8-10	8-10	8-11
Hw trg. cells	3-4	2-3	3-4	3-4	4-5	3-4	3-4
Hw suptr. crossv.	1-2	1-2	1-2	1-2	1-2	1-2	1-2
Hw cub. crossv.	4-6	3-5	4-6	4-6	5-6	4-6	4-6
Hw fork cells	3-4	2-3	2-3	3	3-4	2-4	2-4
Hw br. crossv.	2-3	1-3	2-4	2-3	2-4	1-3	2-3
Hw max. length	48.2-52	41.7-46	41.3-48.8	46.4-50.25	47.8-53.9	43.3-50.05	47.2-50.4
Hw max. width	13.6-16.3	13.5-15	13.8-16.1	14.1-16.4	14.8-17.3	13.3-16.1	14.8-18.8
Hw pt length	2.6-3.2	2.6-3.1	2.3-2.9	2.8-3.35	3-3.8	2.5-3.4	2.5-3.7



Figures 1-2. *Marmaraeschna* colour pattern schemes, see references in text – (1) pterothorax; (2) S4.

The colour pattern of S3-8 is composed of the following pale spots (terminology of Walker 1912): narrow AD confluent or separated from AL (AL', a pale area between AD and AL, is present in some species), AL reaching transverse carina posteriorly, small and triangular MD separated from ML, ML confluent or separated from AL and PL, PD confluent with PL, and PD with an anteriorly directed projection (PD'), which is in some cases separated from PD (Fig. 2).

***Aeshna (Marmaraeschna) brevicercia* sp. nov.**

(Figs 3, 13, 20, 27, 34, 41, 50)

*Aeshna (Marmaraeschna) intricata* Martin. — Calvert (1956): 112-119, in part, male from Guama Yacu, Ecuador.

*Aeshna (Marmaraeschna) vigintipunctata* Ris. — De Marmels (1988): 101, Figs 22-26, record from Tachira, Venezuela, Fig. male and female terminalia, and male auricle and genital fosseta. — De Marmels (1990): 337, listed from Venezuela. — De Marmels (1994): 437, comments on wing venation.

### Material examined

Holotype ♂, Ecuador, between Calacali and Nanegalito, ca. 30 km W Quito, Pichincha prov., 2,000 m, 04 xi 1990, O.S. Flint Jr. leg. (USNM). Allotype ♀, Ecuador, Santo Domingo de los Colorados, Pichincha prov., 24 i 1988, Morales leg. (MLP). Paratypes: Venezuela, Trujillo prov., Mesa, 2,000 m, 29 x 1955, K. leg., 1 ♀, Coll. no. 13877 (IZA); Vía Boconó – La Cristalina, 21 iii 1992, M. Gaiani leg., 1 ♀, Coll. no. 16227 (IZA); Mérida prov., Mérida, 2,600 m, 04 iv 1966, Antequera leg., 1 ♂, Coll. no. JR-10896 (IZA); El Valle, Asentamiento Monterrey, 2,360 m, 11 ii 1983, J. De Marmels leg., 1 ♀, Coll. no. 14551 (MLP, ex IZA); La Mucuy, 2,400 m, 04 ix 1956, C.J. Rosales leg., 1 ♀, Coll. no. 13907 (IZA); Loma de Benito, cerca de Guaraque, 2,000 m, 20 xii 1982, J. Lattke leg., 1 ♂, Coll. no. 14734 (IZA); Barinas prov., San Isidro, 2 vii 1975, J.S. leg., 1 ♂, Coll. no. 13906 (IZA); Táchira prov., Betania, 2,250 m, 10 viii 1987, F. Rey leg., 1 ♂, Coll. no. 16037 (IZA); carretera Bramón – Las Delicias, 1,800 m, 16-18 vii 1980, Exp. IZA leg., 1 ♀, Coll. no. 13908 (I) (IZA); carretera Rubio – Delicias, 1,600 m, 27 ix 1966, 1 ♂, Coll. no. 13878 (IZA); Delicias, 1,650 m, 2 i 1983, R. Mattei leg., 1 ♂, Coll. no. 14973 (I) (IZA); Betania – Tamá, 2,400 m, 17-20 iii 1983, Exp. IZA leg., 1 ♂, Coll. no. 14544 (II) (MLP, ex IZA); Tamá, 2,400 m, 17-20 iii 1983, Exp. IZA leg., 1 ♀, Coll. no. 14553 (II) (IZA); Ecuador: Pomasqui, 20 ii 1970, 1 ♂ (FSCA); Guama Yacu, near Agoyan, 3,000 m, 09 v 1936, W. Clarke-McIntyre leg., 1 ♂ (\*) (RWG, ex UMMZ); Puenbo, no. 7, 1 ♀ (\*) (ANSP); Esmeraldas prov., Esmeraldas, 300 m, 27 v 1988, D. Poveda leg., 1 ♂ (MLP, ex PUC); Imbabura prov., Ibarra, 02 xi 1991, F. Martinez leg., 1 ♀ (PUC); Atuntaqui, 2,500 m, 26 xii 1988, C. León leg., 1 ♂ (PUC); Pichincha prov., same data as holotype, 4 ♂ (USNM); Pichincha, 2,300 m, ii 1991, León leg., 1 ♂ (PUC); Quito, iv 1975, M.L. Pérez leg., 1 ♂ (PUC); Sangolqui, 15 xi 1993, Padilla leg., 1 ♂ (PUC); same data but 07 ix 1993, 1 ♂ (PUC); Conocoto, 28 vi 1992, P. Fernández leg., 1 ♀ (PUC); same data but 05 iii 1993, G. Dávalos leg., 1 ♀ (PUC); lago San Pablo, ca 2,600 m (0°12'30"N, 78°12'30"W), 11 xii 1998, V. Bürkle & H. Werning leg., 2 ♂ (MNB); Manabi prov., Manabi, iii 1949, W. Clarke-McIntyre leg., 1 ♀ (UMMZ, ex C.H. Kennedy Coll.).

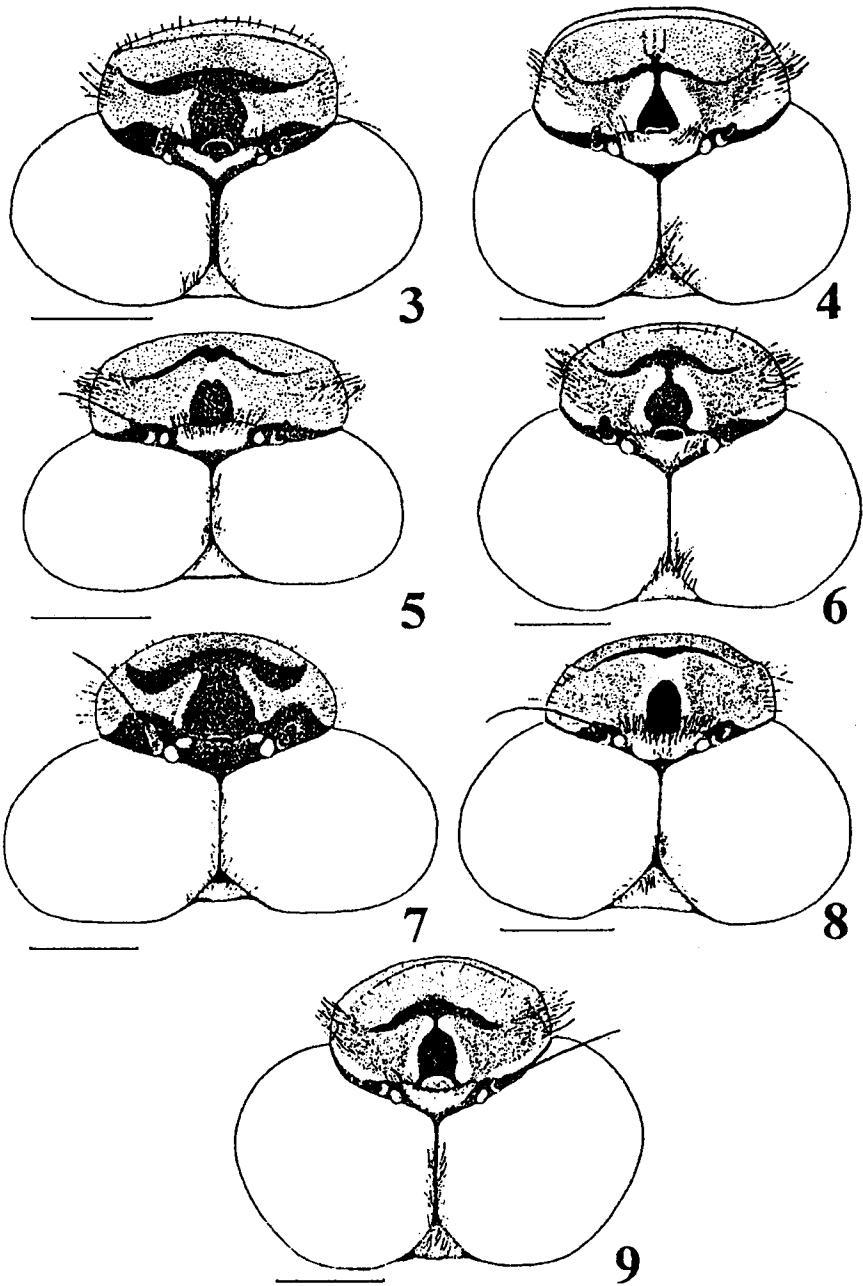
### Etymology

An adjective from the Latin *brevis* (short) and the Greek *kerkus* (tail), referring to the short female cerci when they are compared with those of *A. vigintipunctata*, the species with which it was previously confused.

### Description

#### Holotype ♂

**Head:** Labrum pale brown, with anterior and posterior margins black. Clypeus light blue [to grey], except margins of clypeal lobes yellow; dark brown stripe over fronto-clypeal groove (as in Figs 11-12). Antefrons light blue [to grey] except lateral 0.50 light yellow. Postfrons light blue [to bluish grey]; T-spot complete and wide, sides of longitudinal stem convex, bordered by a light yellow [to light blue] spot as wide at its base



Figures 3-9. Head dorsal view — (3) *Aeshna (Marmaraeschna) brevicercia* sp. nov. holotype; (4) *A. (M.) brevifrons* ♀ from Chile, Atacama, Huasco Bajo, 13 ii 1944; (5) *A. (M.) fissifrons* sp. nov. allotype; (6) *A. (M.) intricata* ♂ from Peru, Cajamarca, Celendin, 9 vi 1936; (7) *A. (M.) obscura* sp. nov. holotype; (8) *A. (M.) pallipes* from Argentina, Salta, Cafayate, Quebrada río Colorado, 5 iv 1996; (9) *A. (M.) vigintipunctata* from Argentina, Salta, Cafayate, Quebrada río Colorado, 29 iii 1997. Bars: 2.5 mm.



as 0.30 [0.25 to 0.30] of the stem width (Fig. 3). Frontal ridge slightly concave in frontal view (as in Fig. 10); black stripe over fronto-ocular groove slightly widened at fronto-clypeal groove (as in Fig. 10). Vertex anterior 0.50 yellow, posterior 0.50 black. Occipital triangle yellow. Long black hairs on lateral surface of clypeus, frons, vertex and occipital triangle. Rear of the head black. Labium pale brown.

**Thorax:** As shown in Fig. 1, except spots 2 and 3 separated [confluent]. Legs with black tarsi; flexor and extensor surfaces of tibiae and femora black, lateral surfaces yellow. Wings hyaline; veins black, except C reddish brown; pterostigma dorsal surface pale brown, ventral surface black [pale brown]; membranule black, except basal 0.50 [0.30] white. Ax: Fw 14-13, Hw 9-10; triangle cells: Fw 4, Hw 3-4; supratriangle crossveins: Fw 2, Hw 1; cubital crossveins: Fw 5-4, Hw 4; rows of cells between fork of IR2 at pterostigma level: Fw 3, Hw 3; bridge crossvein: Fw 3-2, Hw 3-2.

**Abdomen:** S3-7 colour pattern as shown in Fig. 2 except: AD absent; AD' very diffuse in S5-6; ML confluent with AL, PL and PD' in S3; PL and PD confluent in S3; PD' present in S3-6, in S3-4 separated from PD, in S5-6 confluent. S8, MD and ML very small and separated; PL and PD confluent. S9, MD and ML absent; PL and PD confluent. S10 pale brown, with posterolateral and dorsoanterior margins black, medially interrupted by a yellow spot, mediolongitudinal stripe at posterior 0.75 black and a small black spot on each side. Ventral terga S4-6 contour as shown in Fig. 13. Cerci and epiproct dark reddish brown, paraprocts black. Cerci external margin straight; inner margin widened suddenly at basal 0.20, maximum width at distal 0.20 (Fig. 34); low dorsal ridge at distal 0.20; sub-basal tooth in lateral view slightly developed, angle obtuse (Fig. 27).

**Measurements (mm):** Head max. width 9.5; head/frons width 1.93; cerci length 5.4; cerci max. width 0.9; epiproct length 2.4; epiproct/cerci length 0.44. Hw length 46.3, width 13.8, pterostigma length 2.7.

#### *Allotype ♀*

**Head:** As holotype except light blue areas greyish and a medial dark brown stripe at 0.50 of labrum length.

**Thorax:** As holotype except dorsal and ventral surfaces of pterostigma dark yellow [spots 2 and 3 confluent] [membranule basal 0.30 to 0.80 white]. Ax: Fw 15, Hw 10-9; triangle cells: Fw 4, Hw 4; supratriangle crossveins: Fw 1, Hw 1; cubital crossveins: Fw 5, Hw 4; rows of cells between fork of IR2 at pterostigma: Fw 3, Hw 3; bcv: Fw 3-2, Hw 3-2.

**Abdomen:** As holotype except: AD in S3-5; very small AD' in S3-6; PD' and PD confluent in S3-7; mediodorsal yellow spot at posterior margin of S8; S9 black, with one dorsomedial diffuse pale brown area, two dorsoposterior and two small irregular yellow spots on each side; S10 yellow with anterior and posterior margins black, two small dorsal black spots and a longitudinal black stripe on each side. Dentigerous plate reddish brown, teeth black. Ventral terga S4-6 contour as shown in Fig. 20. Cerci dark reddish brown, epiproct black, paraprocts black with a lateral yellow spot. Cerci mucronate; apex on external margin (Fig. 41).

**Measurements (mm):** Head max. width 9.6; head/frons width 1.65; cerci length 2.8; cerci max. width 0.6. Hw length 49.1, width 14.7, pterostigma length 3.0.

*Distribution*

Ecuador: Esmeraldas, Imbabura, Pichincha and Manabí provinces; Venezuela: Trujillo, Mérida, Barinas and Táchira provinces (Fig. 50).

***Aeshna (Marmaraeschna) brevifrons* Hagen, 1861**

(Figs 4, 10, 14, 21, 28, 35, 42-43, 50)

*Aeshna brevifrons* Hagen (1861): 129, 314, syntypes: ♂ from Acapulco, Mexico and ♀ from Valparaíso, Chile). — Hagen (1875): 36, listed from South America: Acapulco, Mexico and Valparaíso, Peru (sic). — Ris (1904): 4, 29, listed from Chile based on Hagen. — Calvert (1905): 181, 186, Pl. 8, Figs 15-16, in key, Fig. male cerci, in part: new record from Arequipa, Peru. — Calvert (1908): 488, comments on altitude and distribution in Mexico and Central America based on Hagen. — Martin (1908): 58, 59, Fig. 54, Fig. male cerci, mention from Mexico to Venezuela, Chile and Peru. — Martin (1911): 12. — Calvert (1952): 256, *Marmaraeschna* subg. nov. — Schmidt (1952): 238, in part: Sachabamba, Peru, 1,700 m, 06 iv 1936, Hamb. Südperu-Exp. 1 ♂, *A. intricata* and *A. vigintipunctata* as junior synonyms. — Calvert (1956): 13, 110-112, Fig. in page 12, Pl. 4, Figs 38-42, 44-47, 50-51, 53-54, in part: syntypes, Arequipa, Peru, 19 xii 1877, A. Agassiz leg., 1 ♀; Arequipa, Peru, 28 x 1898, W.J. Gerhart leg., 1 ♂; Poroma, Tarapacá, Chile, 10 iii 1948, 1 ♂; Fig. male and female wings, frons, terminalia, male genital fossa, pterothorax and S6. — Paulson (1977): 175, in part, listed from Chile.

*Aeshna (Marmaraeschna) intricata* Martin. — Calvert (1956): 112-119, in part: Putre, Chile, 25 ii 1948, 1 ♂. — Fraser (1957): 155, 159, 163, Fig. 4g: head dorsal view, in key, listed from Chile and recorded from Tarapacá; redetermined based on Fraser's figure. — Jurzitza (1989): 9, in part, listed from Chile based on Calvert and Fraser.

*Not confirmed records*

*Aeshna (Marmaraeschna) brevifrons* Hagen. — Calvert (1905): 186, in part: new record from Baños de Cauquenes, Chile. — Förster (1909): 217-218, record from Sapucay, Paraguay. — Martin (1921): 23, listed from Chile. — Hincks (1934), paper not seen, taken from Rácenis (1959), record from Peru. — Needham & Bullock (1943): 358-359, listed from Chile, in key. — Schmidt (1952): 238, 254, record from Peru: Sachabamba, 1 ♀; Ocaña, 2,600 m, 1 ♂, 1 ♀; Tayapampa, 4,025 m, 1 ♀, 1 larva; Huacaña, 3,200 m, 1 ♂; Ayacucho, 1 ♂. Record from Chile: Cauquenes, 3 ♂, 3 ♀. — Needham & Etcheverry (1956): 213, record from Tarapacá, Chile. — Rácenis (1953): 38, mentioned from Mexico, Venezuela, Peru and Chile. — Herrera et al. (1956): 81-82, 84, listed from Chile and recorded from Tarapacá, Chile, Fig. hindwing. — Calvert (1956): 110-112, Pl. 4, Figs 43, 48, 52, record from Peru: Lima, Dr. P. Martin, 1 ♂, No. 5469; Matucana, Lima Dept., 26-27 v 1920, J.H. Williamson, 6 ♂ and 2 ♀, UM; Chile: Socoroma, 2 iii 1948, 1 ♂; Mini Mini, 18 ii 1948, 1 ♀; Taltal, 20 i 1942, 1 ♂; Santiago, 24 v 1948, S. Barros Vallenzuela, 1 ♀. — Fraser (1957): 159, 164-165, listed from Chile, in key,

comparison with *A. (Neureclipsa) diffinis* (Rambur). — Rácenis (1959): 493, listed from Peru based on previous papers. — Paulson (1977): 175, listed from Paraguay.

### *Material examined*

Lectotype ♂, by present designation, Mexico: Acapulco (\*+) (MCZ); Paralectotype ♀, by present designation, Chile: Valparaíso (\*+) (MCZ). Peru: Lima prov., Yauyos, río Cañate, 3,100 m, i 1960, W. Weyrauch leg., 1 ♂, 1 ♀ (FML); Apurímac prov., Abancay, 2,000–3,000 m, iii–iv 1996, 1 ♂ (MLP); same but 2,550–3,000 m (13°38'S, 72°51'W), vi–vii 1995, W. Braun leg., 2 ♀ (WB); Arequipa prov., Arequipa, 19 xii 1877, A. Agassiz leg., 1 ♀ (\*+) (MCZ); Arequipa, 28 x 1898, W.J. Gerhardt leg., 1 ♂ (\*+)(ANSP); Escomel, 1 ♀ (USNM); Ica prov., Sachabamba, 1,700 m, 06 iv 1936, E. Schmidt leg., 1 ♀ (\*) (FSCA); Chile: Baños de Colura, 23 xii 1945, L. Peña leg., 1 ♀ (MNHN); Tarapacá region – Parinacota prov.: Chapiquina, town in the Arica mountain range (18°23'S, 69°33'W), 3,280 m, 15 x 1952, L.E. Peña leg., 1 ♀ (UMMZ); Putre, 25 ii 1948, 1 ♂ (\*) (FSCA); same data but 26 ii 1948, 1 ♀ (FSCA); Belén (18°28'S, 69°32'W), 3,340 m, 17 x 1952, L.E. Peña leg., 1 ♂, 1 ♀ (UMMZ); same data but 18 x 1952, 1 ♂ (MLP, ex UMMZ); same data but 23 x 1952, 1 ♀ (UMMZ); same data but 25 x 1952, 1 ♀ (UMMZ); Arica prov.: Chaca, 05–08 xi 1955, L.E. Peña leg., 1 ♀ (UMMZ); Arica, 29 xi 1946, 1 ♀ (FSCA); Camarones, fertile valley in the middle of the desert (19°00'S, 69°47'W), 27–30 xi 1952, L.E. Peña leg., 3 ♂, 3 ♀ (UMMZ); same data, 1 ♂ (MLP, ex UMMZ); Iquique prov.: 1 ♀ (MNHN); Aroma (19°36'S, 69°28'W), iii 1885, 1 ♀ (MNHN); Parca, 8 km N of Mamiña, valley surrounded by high mountains with small irrigation streams for alfalfa crops, 2,500 m, 21 ix 1951, L.E. Peña leg., 1 ♂ (UMMZ); Mamiña, place of naturally warm waters used for irrigation, (20°05'S, 69°14'W), 2,700 m, 11–15 ix 1951, L.E. Peña leg., 1 ♀ (UMMZ); same data but 16–19 ix 1951, 1 ♀ (MLP, ex UMMZ); Poroma, 10 iii 1948, 1 ♂ (\*) (FSCA); Noasa, 12 km E of Parca, 3,500 m, 22 ix 1951, L.E. Peña leg., 1 ♂ (UMMZ); Antofagasta region — El Loa prov.: San Pedro de Atacama, 2,436 m, 9–12 vi 1952, L.E. Peña leg., 1 ♀ (UMMZ); same data but 23 iii 1982, J. Yañes leg., 1 ♀ (MNHN); Baños Puritama, 25 km NE of San Pedro de Atacama, 15 km from Bolivian border, odonates fly over a thermal creek with 37–38 °C, 19–20 ii 1960, L.E. Peña leg., 3 ♂, 1 ♀ (UMMZ); same data but 24 iv 1952, 3 ♂, 11 ♀ (UMMZ); same data, 1 ♂, 1 ♀ (MLP, ex UMMZ); Atacama region — Huasco prov.: Huasco-Bajo, 13 ii 1944, 1 ♀ (FSCA); Coquimbo region — Elqui prov.: Paiguano (30°01'S, 70°30'W), Wagenrecht leg., 1 ♀ (IEUM); Choapa prov.: Hacienda Illapei (31°36'S, 71°07'W), 600–900 m, 19 x 1966, E.I. Schlinger, Irwin & Peña leg., 1 ♀ (RWG); Hda. Illapel, 1,800–2,000 m, 09 xi 1954, L.E. Peña leg., 1 ♂ (UMMZ); same data but 29–30 x 1954, 1 ♂ (UMMZ); same data, 1 ♂, 1 ♀ (MLP, ex UMMZ); ca 9 km S of Huanta, 07 xii 1950, Ross & Michelbacher leg., 1 ♀ (FSCA); El Pangue, x 1963, 1 ♂ (DRP); Chigualoco, 27–28 xi 1964, Pino leg., 1 ♀ (IEUM); Valparaíso region: El Granizo, xi 1968, Herrera leg., 2 ♂, 1 ♀ (IEUM); Metropolitan region: Chacabuco prov., Colina, xi 1966, 1 ♀ (MNHN); Cordillera prov., Río Clarillo, 21 x 1987, J. Mellado leg., 1 ♀ (IEUM); Quebrada de la Plata, Rinconada, Maipú, 23 xii 1960, L. Stange leg., 1 ♀ (FML); Santiago, Quebrada de La Plata (33°30'S, 70°55'W), near Maipú, 510 m, 30 x 1966, E.I. Schlinger leg., 1 ♂ (RWG); Santiago, 7 km E of Río Maipo, 22 i 1978,

O.S. Flint Jr. leg., 1 ♂ (UNSM); La Principal, 17 i 1952, 1 ♀ (IEUM); De Los Lagos region: Valdivia prov. , Valdivia, 10 i 1959, Wagenknecht leg., 1 ♂ (IEUM).

### *Redescription*

**Head:** Pale brown or yellow with dark grey or light blue darker areas (Figs 4, 10); black stripe over fronto-clypeal groove widest at its central region (Fig. 10); black stripe over fronto-ocular groove slightly widened at fronto-clypeal groove; longitudinal stem of T-spot narrowly joined with, or separated from, the transverse arms; frontal ridge sinuous; ocular groove with a black stripe widened at fronto clypeal groove level.

**Thorax:** As shown in Fig. 1, except spot 2 or 2, 3, 5, 6 and/or 8 absent, 5 and 6 confluent or separated, spot 4 always well defined.

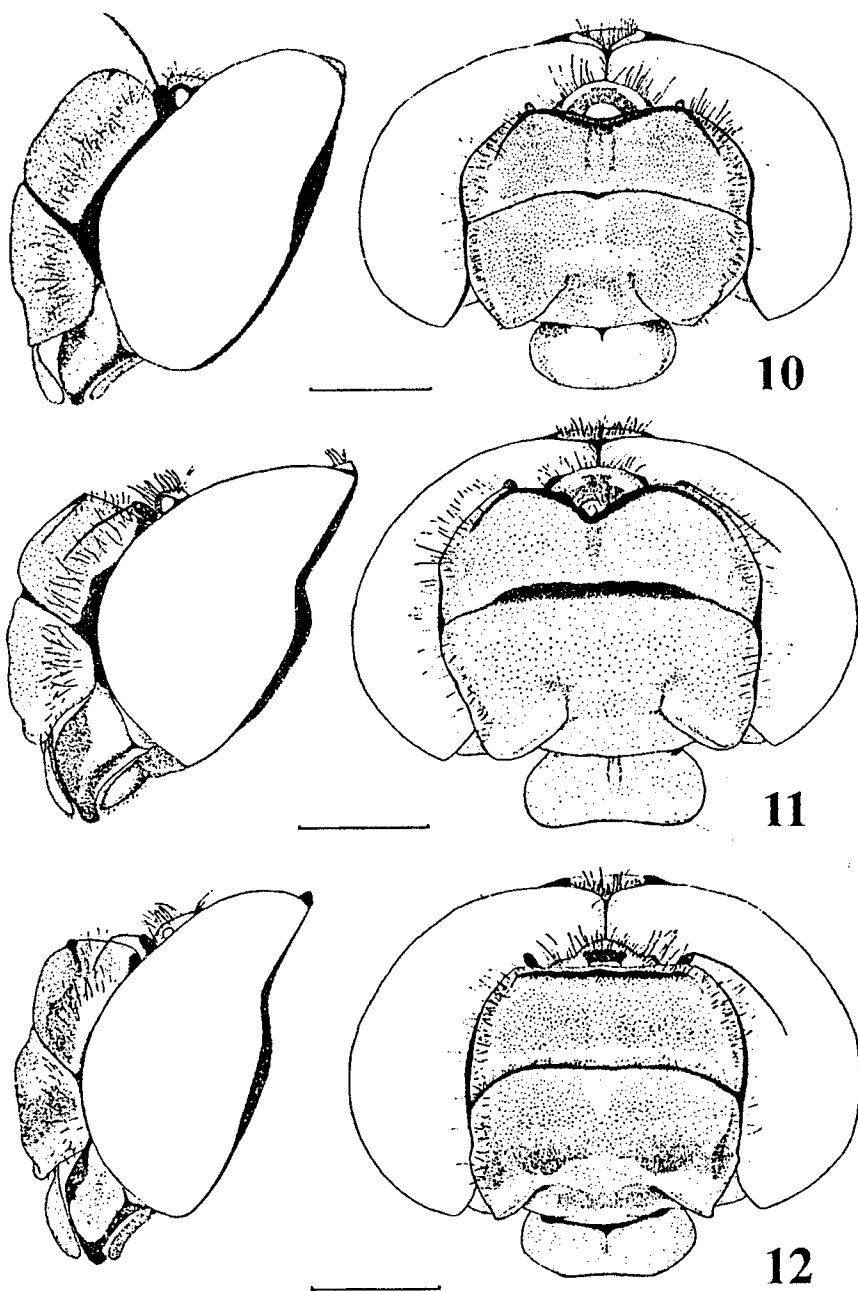
**Abdomen:** S3-7 colour pattern as shown in Fig. 2 except: AD and AL separated in S5-7, S6-7 or S7, or confluent; AL and ML separated in S4-7 or S5-7, or confluent; MD and ML separated in S3-7 or S4-7; ML and PL confluent in S3, S3-4 or S3-5; PD' absent or present in S3-6 or S3-7, separated or confluent with PD. S8: AL and AD absent; ML separated from MD and PL; PL and PD confluent. S9: AD, AL, MD and ML absent; PL and PD confluent. S10 pale brown, with anterodorsal margin black, medially interrupted by a yellow spot, with or without a posterodorsal black spot. Ventral terga S4-6 contour as shown in Figs 14, 21. Cerci and epiproct dark reddish brown, paraprocts black. Cerci external margin straight; inner margin widened at basal 0.30, and then nearly parallel (Fig. 35); dorsal ridge slightly developed at distal 0.20, not seen in lateral view; sub-basal tooth in lateral view slightly developed, angle obtuse (Fig. 28). Sub-basal tooth of male cerci slightly developed; apex on external margin; dorsal ridge slightly developed. Female cerci rounded or mucronate (Figs 42-43).

### *Distribution*

Peru: Lima, Ica, Apurimac and Arequipa provinces; Chile: Tarapacá region – Parinacota, Arica and Iquique provinces; Antofagasta region – El Loa province; Atacama region – Huasco province; Coquimbo region – Elqui and Choapa provinces; Valparaiso region; Metropolitan region – Chacabuco, Santiago and Cordillera provinces; De los Lagos region – Valdivia province (Fig. 50). The record of *A. brevifrons* from Acapulco, Mexico (Hagen 1861) is here considered erroneous because this species has been never found again in this country (González 1993; González & Novelo 1997) or in Central America (Donnelly 1992; Maes 1992; Boomsma & Dunkle 1996) or in Brazil.

### *Remarks*

In his redescription of *A. brevifrons*, Martin (1908) did not mention the source of the studied specimens, and stated that the types were deposited at the Museum of Vienna. The only specimen deposited at this collection, 1 ♂ from Chile, Novara Expedition, determined by Brauer, does not have any type label (U. Aspöck pers. comm.). From photographs sent to us by Dr. Aspöck we can confirm Brauer's determination, and suspect that this specimen was the one drawn by Martin (1908: Fig. 54). We agree



Figures 10-12. Head lateral and frontal views – (10) *Aeshna (Marmaraeschna) brevifrons* holotype; (11) *A. (M.) fissifrons* sp. nov. allotype; (12) *A. (M.) pallipes* same as Fig. 8. Bars: 2.5 mm.

with Calvert (1956: 112) considering that the types of *A. brevifrons* are the above mentioned ♂ from Acapulco, Mexico, type number 8831 and now lectotype, and ♀ from Valparaíso, Chile, type number 88312 and now paralectotype, both deposited in MCZ. The lectotype designation has been made with the purpose of clarifying the application of the name *brevifrons* to a taxon.

***Aeshna (Marmaraeschna) fissifrons* sp. nov.**

(Figs 5, 11, 15, 22, 29, 36, 44, 50)

*Aeshna (Marmaraeschna) brevifrons* Hagen. — Schmidt (1952): 238, in part, Querobamba, Peru, 3,520 m, 17 iv 1936, 1 ♂.

*Aeshna (Marmaraeschna) intricata* Martin. — Calvert (1956): 13, 112-119, figure in page 12, Pl. 20, Figs 258-260, 262-272, in part: Tarma, Peru, 30-31 v 1920, J.H. Williamson leg., 1 ♂, 1 ♀, male redetermined based on Calvert's figures; vicinity of Concepción, Peru, 7-8 iv 1935, F. Woytkowsky leg. 1 ♀, redetermined based on Calvert's figures; Querobamba, Peru, 3,520 m, 17 iv 1936, 1 ♂; Fig. male and female terminalia, frons, S2 and S6, male pterothorax and genitalia. — Rácenis (1959): 494, in part: record from Querobamba, Tarma and ♀ from Concepción, Peru, taken from Calvert (1956). — Paulson (1977): 175, in part, listed from Argentina. — Rodrigues Capítulo et al. (1991): 62, in part, record from Argentina, based on Paulson (1977). — Rodrigues Capítulo (1992): 38, 57, Fig. 173, in part, record from Argentina based on Paulson (1977), male terminalia redrawn from Calvert (1956: Pl. 20, Figs 258-259).

*Material examined*

Holotype ♂, Argentina, 7 km S Minas Capillitas, Catamarca prov., ca. 3,000 m, 27 xii 1972, J. Schultz leg. (DRP). Allotype ♀, Argentina, Salta prov., quebrada Río Colorado, Cafayate (26°05'30''S, 66°00'24''W), 1,750 m, 29 iii 1997, N. von Ellenrieder leg. (MLP). Paratypes: Peru: La Huerta, 3,800 m, 24-28 xi 1955, L.E. Peña leg., 1 ♂ (UMMZ); Camacani, 3,700 m, 19-21 xi 1955, L.E. Peña leg., 1 ♂ (UMMZ); Junín prov.: Huancayo, 3,200 m, 15 xi 1947, Weyrauch leg., 1 ♂ (FML); Tarma, 30 v 1920, J.H. Williamson leg., 1 ♀ (\*+) (RWG); Acolla, ca Jauja, 3,460 m, v 1953, F. Blancas leg., 1 ♀ (USNM); Ayacucho prov., Querobamba, 3,520 m, 17 iv 1936, 1 ♂ (\*III) (FSCA); Cuzco prov., stream at Sacsayhuaman, above Cuzco, 13 vi 1977, D. Paulson leg., 1 ♂, 1 ♀, Coll. no. 77-11 (DRP); Bolivia: Cochabamba Dept., 95 km from Cochabamba, 11 i 1982, J.C. Lien leg., 1 ♂, Coll. no. OB-0026 (FSCA); Chile: Antofagasta region – El Loa prov., Inacaliri, Andes near Bolivia in the Silala place, 4,000 m, 01-14 ii 1960, L.E. Peña leg., 2 ♂, 2 ♀ (UMMZ); same data, 1 ♂ (MLP, ex UMMZ); Argentina: Salta prov., same data as allotype, 4 ♀ (MLP); same data as allotype but 05 v 1996, 1 ♀ (MLP); San Carlos dept., San Antonio (25°59'43''S, 66°01'55''W), 02 iv 1999, N. von Ellenrieder leg., 3 ♀ (MLP); Los Andes dept., ayo. Incahuasi, Co. Acay Chico, ca 3,900 m, 22 i 1998, N. von Ellenrieder leg., 3 ♀ (MLP); Salta, June 1942, 1 ♀ (MACN); Cachi, 2,500 m, S. Steinbach leg., 1 ♀ (MNB).

### *Etymology*

A noun from the Latin *fissus* (clef) and *frons* (front), referring to the cleft frontal ridge.

### *Description*

#### *Holotype* ♂

**Head:** Labrum pale, with [without] two brown spots on posterior margin. Labro-clypeal groove black. Anteclypeus pale, with [without] a trilobulate brown spot on posterior margin. Postclypeus brown except margins of clypeal lobes pale. Fronto-clypeal groove black (Fig. 11). Antefrons brown except anterior margin and lateral areas light blue. Postfrons brown, T-spot incomplete (Fig. 5). Frontal ridge black, with a medial deep cleft in frontal view (Fig. 11); black stripe over fronto-ocular groove slightly widened from anterior 0.50 of frons to fronto-clypeal groove (Fig. 11). Vertex pale, margins black. Occipital triangle yellow. Long black hairs on lateral surface of clypeus, frons, vertex and occipital triangle. Rear of the head black. Labium yellowish.

**Thorax:** As shown in Fig. 1, except spot 2 diffuse [3 diffuse or 2 and 3 dark], 4 diffuse and confluent [separated] with 5 and 6, 5 and 6 confluent and “V” shaped. Legs black except tibiae and extensor surfaces of femora yellow. Wings hyaline; veins black, except C basal to nodus yellow; pterostigma yellow; membranule black, except basal 0.50 white. Ax: Fw 14-12, Hw 9-8; triangle cells: Fw 4, Hw 4-3; supratriangle crossveins: Fw 2, Hw 2; cubital crossveins: Fw 6, Hw 5; rows of cells between fork of IR2 at pterostigma level: Fw 3, Hw 3; bcw: Fw 3, Hw 3.

**Abdomen:** S3-7 colour pattern as shown in Fig. 2 except: MD and ML confluent in S3; MD and PD confluent [separated] in S3; AL' present [absent] in S3-7; AL, ML and PL confluent in S3-4 [only in S3]; [AL and ML separated in S3-4 or S7]; [PD' and PD separated in S3 or S3-4]. S8-9 black with posterior 0.30 yellow and two anterodorsal and one lateral yellow spots on each side. S10 yellow, black pattern as follows: Anterior margin, a lateral spot on each side and two small posterodorsal spots. Ventral terga S4-6 contour as shown in Fig. 15. Cerci dark brown except basal 0.30 black. Epiproct and paraprocts brown, emarginated by dark brown or black. Cerci widened distally from sub-basal tooth, maximum width at distal 0.30; external margin straight; sub-basal tooth slightly developed; dorsal ridge at distal 0.19; apex on external margin (Fig. 36).

**Measurements (mm):** Head max. width 9.4; head/frons width 1.8; cerci length 4.5; cerci max. width 0.7; epiproct length 2.4; epiproct/cerci length 0.53. Hw length 47.6, width 14.8, pterostigma length 2.8.

#### *Allotype* ♀

**Head:** As holotype except brown spots on labrum posterior margin and without trilobate brown spot on posterior margin of anteclypeus.

**Thorax:** As holotype except spot 2 and 3 darker, 4 well defined and separated from 5 [as holotype], 5 and 6 separated [confluent]. Ax: Fw 13-14, Hw 8-9; triangle cells: Fw 4, Hw 3; supratriangle crossveins: Fw 1, Hw 1; cubital crossveins: Fw 6, Hw 5-4; rows of cells between fork of IR2 at pterostigma: Fw 3, Hw 3; bcw: Fw 3, Hw 2-3.

**Abdomen:** As holotype except MD and ML not confluent; MD and PD separated; AL' present in S4-7 [S3-7]; AL, ML and PL confluent in S4-6 [S5-6]; [AL and ML separated in S3-4 or S7]. S9 with 3 basal pale spots, the medial one triangular. S10 pale, black pattern as follows: 2 posterior dorsal spots, anterior margin interrupted middorsally, posterior margin, a lateral irregular stripe. Dentigerous plate brown [black, pale], teeth black. Ventral terga S4-6 contour as shown in Fig. 22. Cerci brown, darker at distal 0.30; epiproct black, dorsal ridge pale; paraprocts pale brown, basal margin black. Cerci mucronate [rounded], external margin straight (Fig. 44).

**Measurements (mm):** Head max. width 9.3; head/frons width 1.66; cerci length 2.0; cerci max. width 0.5. Hw length 47.0, width 15.1, pterostigma length 2.9.

#### *Distribution*

Peru: Junín, Ayacucho and Cuzco provinces; Bolivia: Cochabamba department; Chile: Antofagasta region (El Loa province); Argentina: Catamarca and Salta provinces (Fig. 50).

#### *Aeshna (Marmaraeschna) intricata* Martin, 1908

(Figs 6, 16, 23, 30, 37, 45, 50)

*Aeshna (Marmaraeschna) intricata* Martin (1908): 59-60, Fig. 55, male and female, Mexico, Peru, Bolivia, Chile, Ecuador, Venezuela, Brazil. — Martin (1911): 12, listed. — Calvert (1952): 256, *Marmaraeschna* subg. nov. — Calvert (1956): 112-119, Pl. 36, Figs 481-482, Pl. 37, Figs 494, 496-497, in part, types and records from Cajamarca and Celendín, Peru, 29 v - 11 vi 1936 (but labelled 9 vi 1936 in the envelope), leg. F. Woytkowski, 1 ♂ and 1 ♀; Fig. female terminalia, frons, S6 and male S1-2. — Rácenis (1959): 494, in part, records from Celendín, Peru, after Calvert (1956). — Muzón & von Ellenrieder (1998): 23, listed with doubts from Argentina based on previous records.

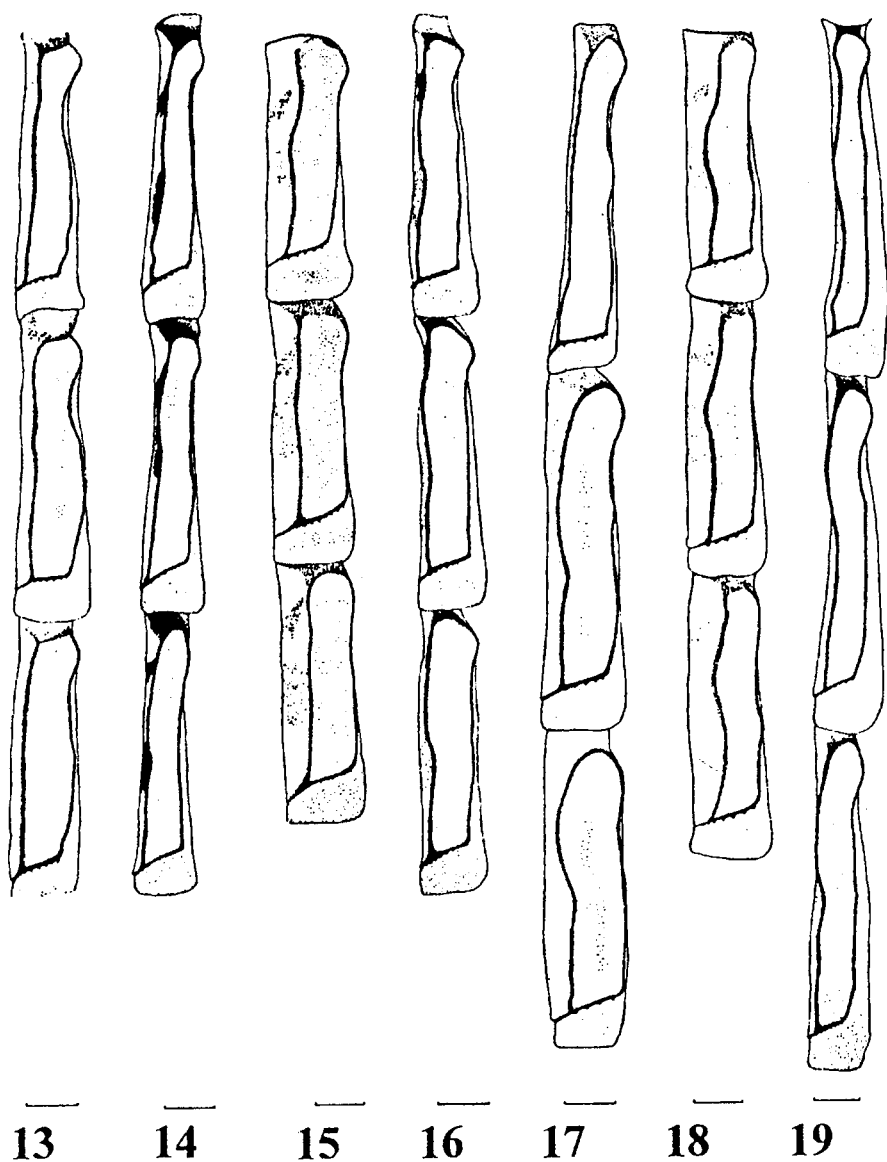
#### *Not confirmed records*

*Aeshna (Marmaraeschna) intricata* Martin. — Förster (1909): 217-218, comments. — Martin (1921): 23, listed from Chile, probably corresponding to *A. brevifrons*. — Pirion (1933): 82, record from Marga Marga, Chile. — Hincks (1934), listed from Peru. — Schmidt (1952): 238, as synonym of *A. brevifrons*. — Rácenis (1953): 37-38, record from Venezuela. — Herrera et al. (1956): 81, 84, listed from Chile; included erroneously 1 ♂ from Vicuña, Coquimbo, Chile, as type of *A. intricata*. — Fraser (1957): 159, 163, listed from Chile, in key. — Rácenis (1959): 494, records from Peru based on previous papers. — Cumming (1964): 21, Table 3, 4; Pl. 5, Figs 49-51, cytology. — Paulson (1977): 175, listed from Brazil, Chile and Colombia or northern South America.

#### *Material examined*

Ecuador: Pallatanga, F. Campos R., no. 62, 63, 2 ♂, no. 64, 1 ♀ (\*) (ANSP). Guasuntos, F. Campos R., 1 ♀ (\*) (ANSP); Pichincha prov., Quito, F. Campos R., no. 40, 1 ♀ (\*)





Figures 13-19. Right terga S4-6 of male, ventral view – (13) *Aeshna (Marmaraeschna) brevicercia* sp. nov. holotype; (14) *A. (M.) brevifrons* from Chile, Antofagasta, Baños Puritama, 25 km NW San Pedro de Atacama, 24 iv 1952; (15) *A. (M.) fissifrons* sp. nov. holotype; (16) *A. (M.) intricata* from Ecuador, Pallatanga, no. 63; (17) *A. (M.) obscura* sp. nov. holotype; (18) *A. (M.) pallipes* from Argentina, Buenos Aires, Sierra de la Ventana, río Sauce Grande, 24/25 ii 1968; (19) *A. (M.) vigintipunctata* same as Fig. 9. Bars: 1 mm.

(ANSP); Peru: Cajamarca prov., Calendín, 2,625 m, 9 vi 1936, F. Woytkowski leg., 1 ♀ (\*+) (FSCA); same data but 11 vi 1936, 1 ♂ (\*+) (FSCA).

### Redescription

**Head:** Black stripe over fronto-clypeal groove. Longitudinal stem of T-spot narrowly joined with transverse arms (Fig. 6) or as wide as 0.50 of T-spot stem width at its base. Frontal ridge sinuous (as Fig. 10); black stripe over fronto-ocular groove slightly widened from anterior 0.50 of frons to fronto-clypeal groove (as Fig. 10), or uniform in width (as Fig. 12).

**Thorax:** As shown in Fig. 1, except spot 2 absent or present, if present confluent or separated from spot 3.

**Abdomen:** S3-7 colour pattern as shown in Fig. 2 except: MD and ML confluent in S3; MD and PD confluent, or separated in S3; AL' present or absent; AL, ML and PL confluent in S3-4 or S3; PD' and PD separated in S3, S7 or S3-4, S6-7. S8-9 black with posterior 0.30 yellow and two anterodorsal and one lateral yellow spots on each side. S10 yellow, black pattern as follows: Anterior margin, a lateral spot on each side and two small posterodorsal spots. Ventral terga S4-6 contour as shown in Figs 16 and 23. Male cerci widened distally from sub-basal tooth level, maximum width at distal 0.30; external margin straight; apex not marginal (Fig. 37); sub-basal tooth well developed, blunt; dorsal ridge at distal 0.19 (Fig. 30). Female cerci pointed, widening distally at basal 0.30, maximum width at medial 0.30 (Fig. 45).

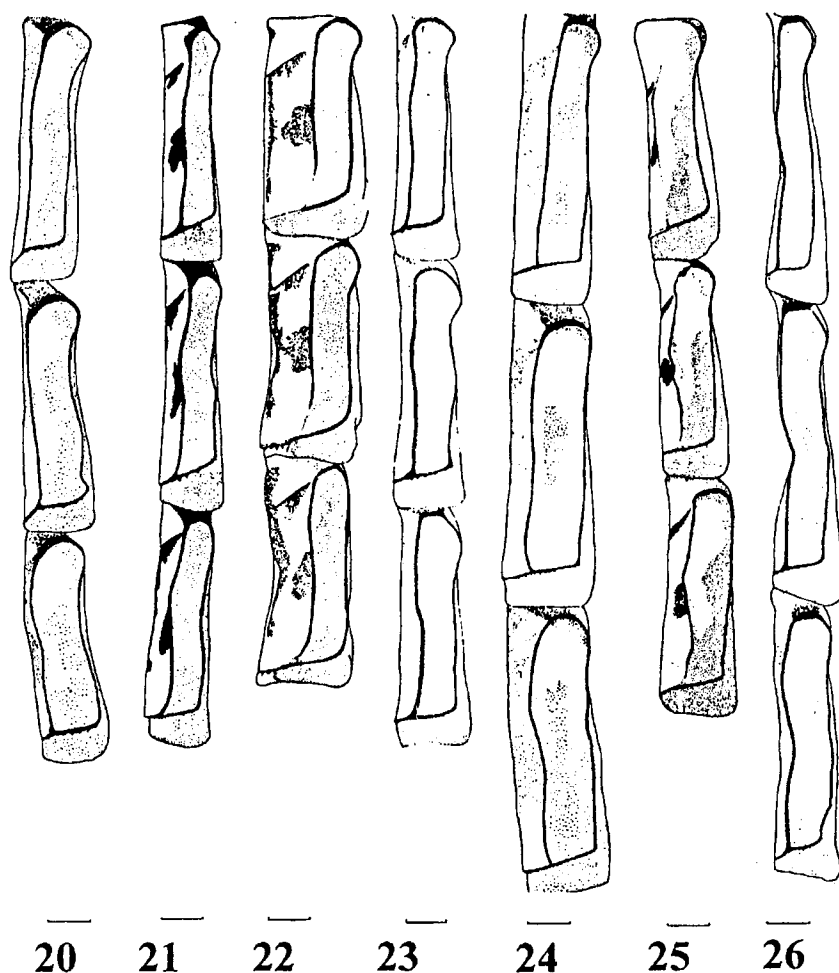
### Distribution

Ecuador: Pichincha province; Peru: Cajamarca province (Fig. 50). The records of *A. intricata* from Mexico and Brazil (Martin 1908) are here considered erroneously assigned to those countries, because this species have been never found again in Mexico (González 1993; González & Novelo 1997), in Central America (Donnelly 1992; Maes 1992; Boomsma & Dunkle 1996), or Brazil.

### Remarks

The present taxonomic state of *A. intricata* is the most confusing among all *Marmaraeschna* species, mainly because the original description was vague and the types were never re-examined. In addition, Calvert (1956) generated more confusion because his key and species diagnoses were based on the assumption of a great intraspecific variation, i.e. length of female cerci between 1.50 and 6.30 mm in *A. intricata*.

There are several doubts about the number, identity, location and source of the types of *A. intricata* (Calvert 1956: 117-119). Martin (1908) stated that the specimens he described as *A. intricata* sp. nov. were deposited at Selys and Martin collections, without further specifications about them, establishing only the distribution area ("habitat") of this new species: Mexico, Venezuela, Peru, Ecuador, Bolivia, Chile and Brazil. Because of the great variability for the females, and the great range mentioned by Martin, we believe that he could have included more than one taxon as *A. intricata*. Considering



Figures 20-26. Right terga S4-6 of female, ventral view – (20) *Aeshna (Marmaraeschna) brevicercia* sp. nov. allotype; (21) *A. (M.) brevifrons* from Chile, Tarapacá, 23 x 1952; (22) *A. (M.) fissifrons* sp. nov. allotype; (23) *A. (M.) intricata* from Ecuador, Guasuntos; (24) *A. (M.) obscura* sp. nov. allotype; (25) *A. (M.) pallipes* holotype; (26) *A. (M.) vigintipunctata* Argentina, Salta, río Yacones, camino entre Yacones y Lesser, 26 iii 1999. Bars: 1mm.

that we were unable to examine *A. intricata* types, we based our determinations of this species on Martin's illustrations of male terminalia (Martin 1908: Fig.55); we identified females by association of colour pattern, ventral abdominal terga contour and head morphology with the male.

Calvert (1956) included 50 specimens in his redescription of *A. intricata*, 12 of which (6 ♂ and 6 ♀) were examined in the present revision, and 1 ♂ and 2 ♀ which could be identified by drawing comparisons. From these, we determined seven (3 ♂ and 4 ♀) as *A. intricata*, two as *A. brevicercia* sp. nov., one as *A. brevifrons*, four as *A. fissifrons* sp. nov. and one as *A. vigintipunctata*. Thus, from all the *A. intricata* drawings made by Calvert (1956: Figs 258-272, 480-482, 490, 494-499), we believe that only Figs 481-482 and 496-497 correspond to this species.

***Aeshna (Marmaraeschna) obscura* sp. nov.**

(Figs 7, 17, 24, 31, 38, 46, 50)

*Aeshna (Marmaraeschna) vigintipunctata* Ris. — Calvert (1956): 119-123, Fig. on p. 12, Pl. 36, Figs 483-484; Pl. 37, Figs 489, 492, in part: Yungas, road to Coroico, 15 km NE of Coroico, Bolivia, 23 v 1899, W.J. Gerhardt leg., 1 ♂; same but 7 iv 1899, 1 ♂; Fig. male terminalia, frons and pterothorax.

*Material examined*

Holotype ♂, Bolivia, sud Yungas prov., La Paz dept., 4 km W Chulimani, 25 v 1989, T.C. Emmel leg. (FSCA). Allotype ♀, Bolivia: Chapare prov., Cochabamba dept., El Palmar 30 km from Villa Tunari, 1,600 m, R. Steinbach leg. (FSCA). Paratypes: Peru, Huanuco prov., Pillao, Inter-Andean forests, 2,700 m, 4 iii 1946, F. Woytkowski leg., 1 ♀ (UMMZ); Bolivia, La Paz dept., Yungas de La Paz, 1,100 m, R. Steinbach leg., 1 ♂ (FSCA); Nor Yungas prov., road to Coroico, 7 iv 1899, W.J. Gerhart leg., 1 ♂ (\*) (MLP, ex FSCA); Nor Yungas prov., 15 km NE of Coroico, 23 v 1899, W.J. Gerhart leg., 1 ♂ (ANSP) (\*+); Ichilo prov., Santa Cruz dept., Buena Vista, 400 m, R. Steinbach leg., 1 ♂ (FSCA); Chile, without locality (in handwriting: *Aeschna brevifrons* Hag., Chili), 1 ♂ (MNHN).

*Etymology*

An adjective from the Latin *obscurus* (dark), referring to the dark body colour pattern compared to the other *Marmaraeschna* species.

*Description*

*Holotype* ♂

**Head:** Labrum yellow, with a central black spot; black stripe over labro-clypeal groove, connected by a black stripe with the central spot. Clypeus light blue, except margins of clypeal lobes yellow; black stripe over fronto-clypeal groove (as in Figs 11-12). Antefrons light blue, brownish near the frontal ridge. Postfrons light blue; longitudinal stem of T-spot widely joined with its transverse arms, sides of longitudinal stem convex, bordered by a light yellow stripe as wide at its base as 0.10 of the stem width (Fig. 7). Frontal ridge sinuous in frontal view (as in Fig. 10); black stripe over fronto-ocular groove slightly widened at fronto-clypeal groove (as in Fig. 10). Vertex black with 2

yellow lateral spots. Occipital triangle yellow emarginated by black. Long black hairs on lateral surface of clypeus, frons, vertex and occipital triangle. Rear of head black. Labium yellow.

**Thorax:** As shown in Fig. 1, except spots 5 and 6 confluent and V shaped. Legs – coxae, trochanters and extensor surface of femora and tibiae brown, femora and tibiae flexor surface and tarsi black. Wings hyaline; veins black, except C yellow at base; pterostigma dorsal surface black, ventral surface pale brown; membranule black, except basal 0.25 white. Ax: Fw 14-13, Hw 9-10; triangle cells: Fw 4, Hw 4; supratriangle crossveins: Fw 2, Hw 2; cubital crossveins: Fw 6, Hw 5; rows of cells between fork of IR2 at pterostigma level: Fw 3, Hw 4; bcv: Fw 4-5, Hw 3-4.

**Abdomen:** S3-7 colour pattern as shown in Fig. 2, except: AD absent; AL absent in S7; MD and PD' confluent in S3 [separated]; ML absent in S7, almost confluent [confluent] with PL in S3; PD' present in S3-6 and S8 [S3-5 and S8; S3-5; S3-6; S3-8], confluent with PD in S6 and S8 [S6; S6-8; S8]. S9 black except a posterolateral pale brown spot on each side. S10 dark brown [with 2 mediolateral pale spots]. Ventral terga S4-6 contour as shown in Fig. 16. Cerci, epiproct and paraprocts black [dark brown]. Cerci inner margin widened suddenly at basal 0.15, maximum width at distal 0.20, apex not marginal (Fig. 38); dorsal ridge at distal 0.30; angle of sub-basal tooth straight (Fig. 31).

**Measurements (mm):** Head max. width 10.1; head/frons width 1.90; cerci length 5.8; cerci max. width 1.0; epiproct length 2.0; epiproct/cerci length 0.34. Hw length 50.9, width 15.0, pterostigma length 3.2.

#### *Allotype ♀*

**Head:** As holotype except black stripe over fronto-clypeal groove wider.

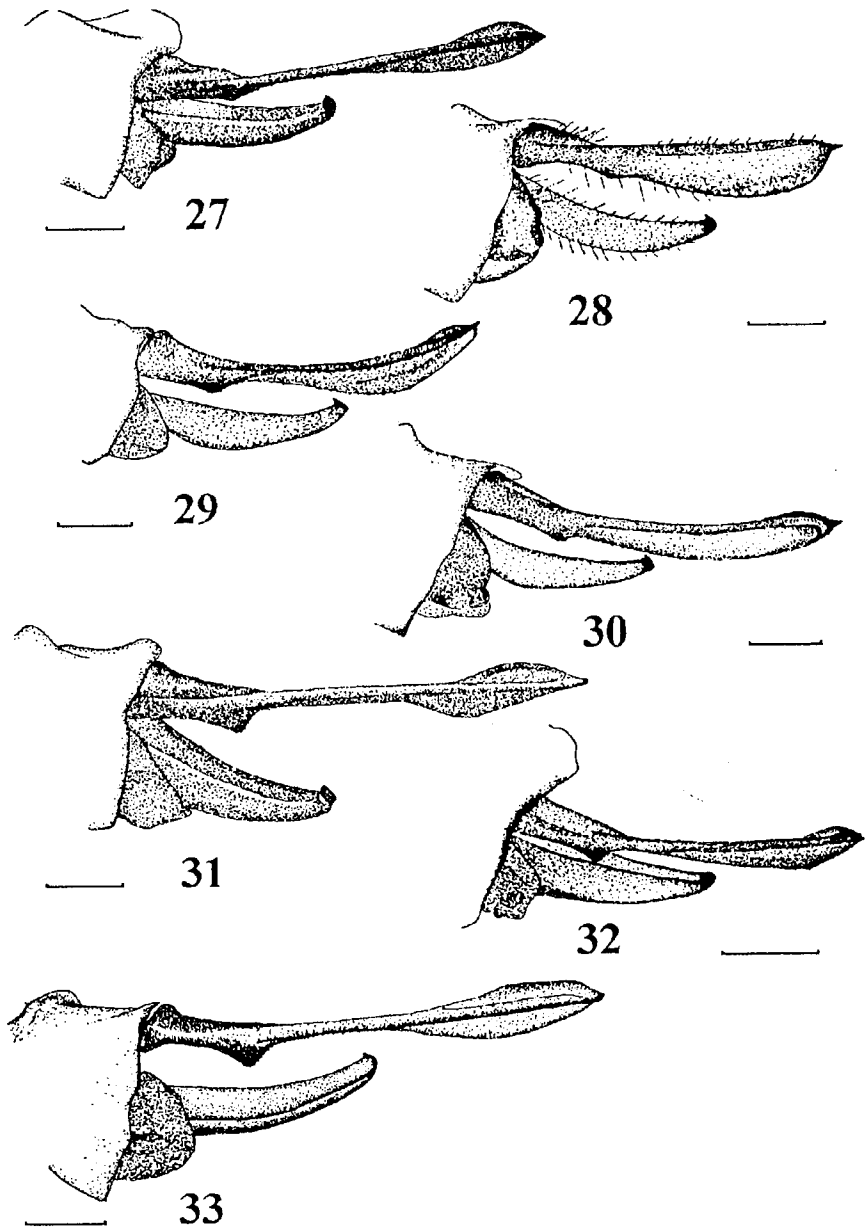
**Thorax:** As holotype [wings tinged with brownish]. Ax: Fw 15, Hw 9; triangle cells: Fw 5, Hw 5-4; supratriangle crossveins: Fw 2, Hw 2; cubital crossveins: Fw 6, Hw 6; rows of cells between fork of IR2 at pterostigma level: Fw 3, Hw 3; bcv: Fw 3, Hw 3.

**Abdomen:** As holotype except: AL absent in S5-7; MD and ML present in S3-7. S8 dark brown with MD spots present, S9-10 dark brown. Ventral terga S4-6 contour as shown in Fig. 24. Dentigerous plate, cerci, epiproct and paraprocts dark brown. Cerci widest at distal 0.25 of their length, mucronate, apex on external margin (Fig. 46).

**Measurements (mm):** Head max. width 10.7; head/frons width 1.7; cerci length 5.8; cerci max. width 1.4. Hw length 53.9, width 17.3, pterostigma length 3.8.

#### *Distribution*

Peru: Huanuco province; Bolivia: La Paz, Cochabamba and Santa Cruz departments; Chile (Fig. 50).



Figures 27-33. Male cerci, lateral view – (27) *Aeshna (Marmaraeschna) brevicercia* holotype; (28) *A. (M.) brevifrons* Chile, Santiago, Quebrada de la Plata near Maipu, 30 x 1966; (29) *A. (M.) fissifrons* holotype; (3) *A. (M.) intricata* same as Fig. 6; (31) *A. (M.) obscura* holotype; (32) *A. (M.) pallipes* Argentina, Buenos Aires, Abra la Ventana, 4 ii 1965; (33) *A. (M.) vigintipunctata* Argentina, San Miguel de Tucumán, 22 iv 1987. Bars: 1mm.

***Aeshna (Marmaraeschna) pallipes* Fraser, 1947**

(Figs 8, 12, 18, 25, 32, 39, 47-48, 50)

*Aeshna laticeps* Hagen (1875): 39, nomen nudum, 1 ♂, Córdoba prov., Argentina.

*Aeshna pallipes* Fraser (1947): 433, 443-445, Fig. 3 a-b, holotype female, type locality Amaicha del Valle, Tucumán. — Calvert (1956): 14, 123-125, included in subgenus *Marmaraeschna*, key, comments and diagnosis after Fraser's original description. — Paulson (1977): 175, listed from Argentina. — Rodrigues Capítulo et al. (1991): 62, record from Tucumán based on type locality. — Rodrigues Capítulo (1992): 38, 57, record from Tucumán based on type locality; female diagnosis in key taken from Fraser's original description. — Muzón & von Ellenrieder (1998): 23, listed from Argentina, new records from Salta, Catamarca, Córdoba and Buenos Aires provinces.

*Aeshna (Marmaraeschna) vigintipunctata* Ris. — Calvert (1956): 119-123, Pl. 36, Figs 478-479, 485-487; Pl. 37, Figs 488, 491, in part, Córdoba, Argentina, 1 ♂, Fig. male terminalia, genitalia, frons and wings. — Rodrigues Capítulo & Muzón (1989): 147-148, 1 ♂ from Sierra de La Ventana, Buenos Aires. — Rodrigues Capítulo et al. (1991): 62, in part, mention from Buenos Aires. — Rodrigues Capítulo (1992): 38, 57, Fig. 178, in part, key taken from Calvert (1956); record from Buenos Aires prov. based on Rodrigues Capítulo & Muzón (1989); redrawn male terminalia after Calvert (1956: Pl. 36, Figs 478-479).

*Aeshna (Marmaraeschna) intricata* Martin. — Paulson (1977): 175, in part, listed from Argentina. — Rodrigues Capítulo et al. (1991): 62, in part, record from Argentina, based on Paulson (1977). — Rodrigues Capítulo (1992): 38, 57, in part, record from Argentina, based on Paulson (1977) and key after Calvert (1956).

*Material examined*

Holotype ♀, Argentina, Tucumán prov., Tafi dept., Amaicha del Valle, 1,800 m, 01 ii 1946, A. Willink leg. (FML). Argentina, Salta prov., San Carlos dept., San Antonio (25°59'43''S, 66°01'55''W), 02 iv 1999, N. von Ellenrieder leg., 1 ♂, 15 ♀ (MLP); same data, 2 ♀ (UMMZ, ex MLP); quebrada Río Colorado, Cafayate (26°05'30''S, 66°00'24''W), 1,750 m, 05 iv 1996, N. von Ellenrieder leg., 1 ♂, 2 ♀ (MLP); same data but 03 iv 1999, 2 ♂, 5 ♀ (MLP); Cachi, 2,500 m, S. Steinbach leg., 1 ♂ (MNB); Catamarca prov., río Potrero, ca. 16 km N Andalgalá, 26 i 1974, M.L. Paulson leg., 1 ♀ (DRP); Termas de Villavil, 4 km N Los Nacimientos, 5 xi 1973, J.C. Schultz leg., 1 ♀ (DRP); La Rioja prov., Chilecito, 1 ♀ no. 32579, 1 ♂ no. 32561 (MACN); Dique Florentino Ameghino, Chilecito, 05 xii 1986, A. Rodrigues Capítulo leg., 1 ♀ in ethanol (MLP); Mendoza prov., Cricyt, Mendoza, 10 xii 1997, G. Debandi leg., 1 ♀ (IADIZA); Córdoba prov., Córdoba, 1 ♂ (\*+) (MCZ) ("type" of *laticeps* nom. nud.); Colón Dept., Talsipuedor (sic), río Ceballos, Sant. Dgo. Senio (Región Terraua), 1956, H. Gorgetta leg., 1 ♀ (FSCA); Calamuchita Dept., "El Sauce", xii 1938, M.J. Viana leg., 2 ♂, 2 ♀ no. 44426 (MACN); San Esteban, 12 ii 1973, Z. Tomsic leg., 1 ♂ (FML); same data but January 1968, 1 ♂ (FML); same data but 20 i 1970, 1 ♂ (FML); Santa Fe prov., Santa Fe, 27 ii 1955, 1 ♀ (MLP); Rosario de Santa Fe, leg. S.V. Hishrich, 2 ♀

(MNB); Buenos Aires prov., río Sauce Grande, Sierra de La Ventana, 24-25 ii 1968, O.S. Flint Jr. leg., 1 ♂, 7 ♀ (USNM), 5 ♀ (FSCA); Abra La Ventana 4 ii 1965, Torres & Ferreyra leg., 1 ♂ (MLP); Sierra de La Ventana, 20 xii 1982, P.C. Baila leg., 1 ♂ (MLP).

### *Male description*

**Head:** Labrum distal 0.50 yellow, basal 0.50 light blue, basal margin black. Clypeus light blue, except ventral margins of clypeal lobes yellow. Black stripe over fronto-clypeal groove. Black stripe over fronto-ocular groove of uniform width. Frontal ridge straight in frontal view (Fig. 12). Antefrons light blue. Postfrons light blue with incomplete T-spot (Fig. 8). Vertex light blue with posterolateral margins black. Occipital triangle light blue or yellow. Labium pale brown. Long black hairs on lateral surface of clypeus, frons, vertex and occipital triangle. Rear of the head black. Labium pale brown.

**Thorax:** As shown in Fig. 1, except spots 7+8, spot 1 diffuse or absent, or 5-6 absent or confluent and diffuse. Legs black except extensor and lateral surfaces of femora and tibiae yellow, and coxae and trochanters reddish brown. Wings hyaline; veins black, except basal 0.30 of C yellow; pterostigma dorsal surface black, ventral surface brown to yellow; membranule black, except basal 0.30 to 0.50 white.

**Abdomen:** S3-7 colour pattern as shown in Fig. 2 except: AD very small; MD and ML confluent in S3, or S3-4, or separated; PD' absent in S3-4 or S3-5. S8 black with an anterior dorsal and lateral yellow spot on each side, and posterior 0.30 yellow. S9 yellow with anterior 0.30 and posterior margin black. S10 yellow with anterior 0.30 and a lateral longitudinal stripe black. Ventral terga S4-6 contour as shown in Fig. 18. Cerci and epiproct black or reddish brown with dorsal surfaces brown. Paraprocts black or reddish brown. Cerci widened gradually towards distal 0.25, where the maximum width is observed, external margin straight, apex on external margin (Fig. 39); sub-basal tooth well developed, angle straight; dorsal ridge at distal 0.20 (Fig. 32).

### *Female redescription*

**Head:** Longitudinal stem of T-spot incomplete, separated from the transverse arms (Fig. 8); frontal ridge straight; black stripe over fronto-ocular groove narrow and of uniform width (Fig. 12).

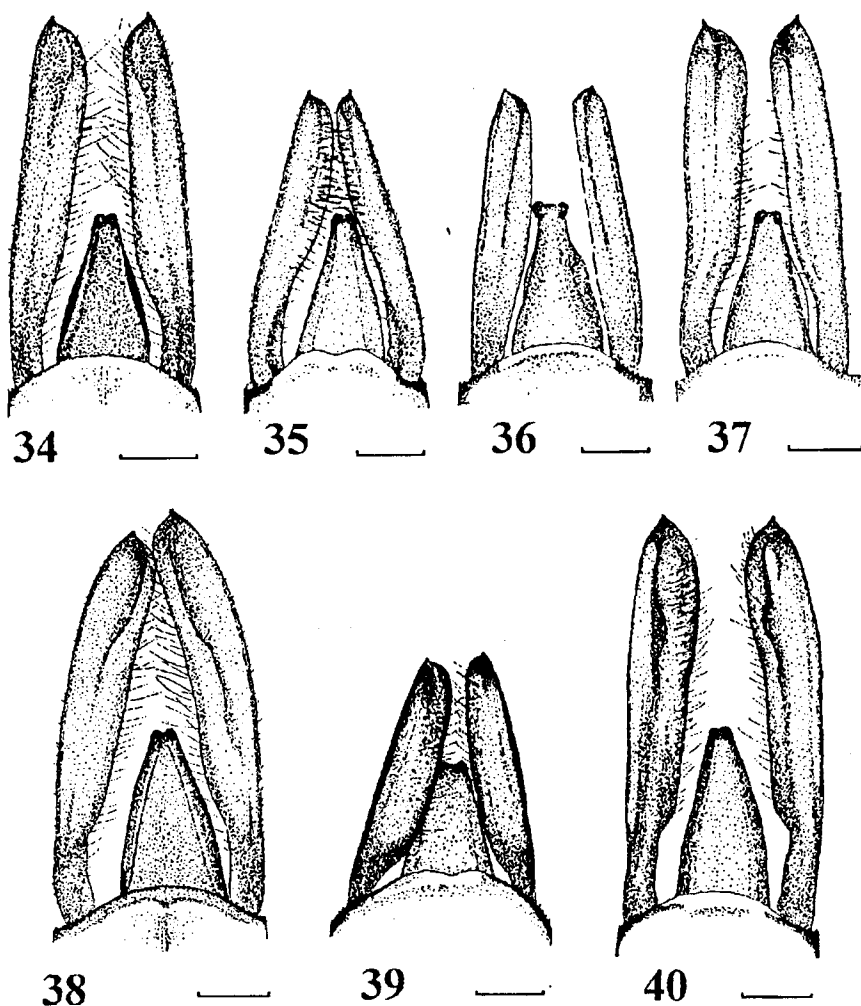
**Thorax:** As shown in Fig. 1, or spots 1-3, 6-8 absent, or 1, 2, 6 absent, 7+8 diffuse, spot 4 always well defined.

**Abdomen:** S3-7 colour pattern as shown in Fig. 2 except: AD and AL separated in S3-5, or confluent; AL and ML separated in S5-7 or confluent; AL, ML and PL confluent in S3, S3-6 or S3-7; PD' in S4-6 or S5-7, confluent with PD. S8-10 as in the male. Ventral terga S4-6 contour as shown in Fig. 25. Cerci mucronate or not (Figs 47-48).

### *Distribution*

Argentina: Salta, Catamarca, Tucumán, La Rioja, Mendoza, Córdoba, Santa Fe and Buenos Aires provinces (Fig. 50).





Figures 34-40. Male cerci, dorsal view, based on same specimens as Figs 27-33 – (34) *Aeshna (Marmaraeschna) brevicercia* sp. nov.; (35) *A. (M.) brevifrons*; (36) *A. (M.) fissifrons* sp. nov.; (37) *A. (M.) intricata*; (38) *A. (M.) obscura* sp. nov.; (39) *A. (M.) pallipes*; (40) *A. (M.) vigintipunctata*. Bars: 1 mm.

### Remarks

Presently, the only available information about *A. pallipes* is that of the holotype description by Fraser (1947). The head of the holotype is lost. During our re-examination of the type we noted that Fraser's drawing of the colour pattern of S7 is incorrect.

*A. pallipes* is similar to *A. fissifrons* sp. nov. mainly in colour pattern, body size and female cerci shape and length; in addition both species sympatrically occur in a large area of Argentina. The best characters to separate these species are frontal ridge shape and ventral abdominal terga contour. In the present revision the only specific character available from the female holotype was the ventral abdominal terga contour; through comparison of this character we have identified both sexes of the species, and confirmed that Fraser's head drawing was right with respect to colour pattern and frontal ridge shape. The range of *A. pallipes* is unique among the *Marmaraeschna* species because it is not restricted to the Andes. However, east of the Andes it inhabits lotic environments in hills of Córdoba and Buenos Aires provinces. For this reason, we doubt about the correction of the Santa Fe province records (old specimens deposited at the MLP and MNB collections), as there are no such lotic habitats in this area, which belong to the Paraná river basin (Fig. 50).

***Aeshna (Marmaraeschna) vigintipunctata* Ris, 1918**

(Figs 9, 19, 26, 33, 40, 49-50)

*Aeshna vigintipunctata* Ris (1918): 163-166, Figs 107-108, syntypes: 2 ♂ from Argentina, Catamarca prov., La Plaza, Cerro Aconquija and 1 ♀ from Peru, Piura prov., Huancabamba; Fig. male pterothorax and terminalia. — Fraser (1947): 433, 446, listed from Argentina; new records from Siambón, Tucumán and Volcán, Jujuy. — Calvert (1952): 256, *Marmaraeschna* subg. nov. — Calvert (1956): 119-123, Pl. 37, Fig. 493, in part: Bolivia, Chapare, Cochabamba, xi 1930, 1 ♂; Fig. male S1-2. — Paulson (1977): 175, listed from Argentina. — Rodrigues Capítulo et al. (1991): 62, in part, records from Catamarca, Jujuy and Tucumán provinces. — Rodrigues Capítulo (1992): 38, 57, in part, records from Catamarca, Jujuy and Tucumán provinces. — Donnelly et al. (1998): 115, Jujuy prov., PN Calilegua, Aguada del Tigre. — Muzón & von Ellenrieder (1998): 23, listed from Argentina, new record from Salta prov.

*Aeshna (Marmaraeschna) intricata* Martin. — Calvert (1956): 112-119, Pl. 36, Fig. 480, Pl. 37, Figs 490, 498, in part: Peru, dept. Amazonas, Chachapoyas, 2,000 m, 8/24 viii 1936, 1 ♀, redetermined with Calvert's figures; Fig. female terminalia, pterothorax and S1-2. — Rácenis (1959): 494, in part: record from Chachapoyas, Peru, 1 ♀ after Calvert (1956).

*Not confirmed records*

*Aeshna vigintipunctata* Ris. — Hincks (1934), record from Peru. — Schmidt (1952): 238, as synonym of *A. brevifrons*. — Soukup (1954): 16, record from Peru: Cajamarca, Amazonas and Moyobamba. — Rácenis (1959): 495, listed from Peru based on previous papers. — Watson (1992): 455, 457, mention of ventral tubercle on S1.

*Material examined*

Bolivia, Cochabamba Dept., Chapare prov., November 1930, F. Steinbach leg., 1 ♂ (+) (FSCA); Ichilo prov., Santa Cruz dept., Buena Vista, 400 m, R. Steinbach Coll.,

1 ♀ (FSCA); Argentina, Jujuy prov., Aguada del Tigre, P.N. Calilegua (23°41'02''S, 64°53'26''W), 1,555 m, 16 i 1997, J. Muzón & N. von Ellenrieder leg., 2 ♂ (MLP); same data, 1 ♂ (UMMZ, ex MLP); Tilcara, February 1954, S. Magno leg., 1 ♀ (MLP); Salta prov., San Carlos Dept., San Antonio (25°59'43''S, 66°01'55''W), 02 iv 1999, N. von Ellenrieder leg., 1 ♂, 1 ♀ (MLP); quebrada de San Lorenzo (24°43'20''S, 65°30'32''W), 25 iii 1999, N. von Ellenrieder leg., 1 ♂ (MLP); río Yacones, camino entre Yacones y Lesser (24°38'48''S, 65°28'57''W), 26 iii 1999, N. von Ellenrieder leg., 1 ♀ (MLP); quebrada del Río Colorado, Cafayate (26°05'30''S, 66°00'24''W), 1,750 m, 29 iii 1997, N. von Ellenrieder leg., 2 ♂ (MLP); Dique Campo Alegre (24°32'59''S, 65°22'17''W), 09 i 1997, P. Perez Goodwyn leg., 1 ♂ (MLP); Catamarca prov., Andalgalá, 02 iii 1974, M.L. Paulson leg., 1 ♀ (DRP); río Potrero, ca 16 km N of Andalgalá, 26 i 1974, M.L. Paulson leg., 1 ♂, 1 ♀ (DRP); same data but J.L. Neff leg., 1 ♂, 1 ♀ (DRP); Catamarca, 22 iii 1928, 1 ♀ (MACN); Las Estancias, 30 i 1965, Rivas leg., 1 ♀ (FML); La Rioja prov., Chilecito, 1 ♂, Coll. no. 32561 (MACN); Tucumán prov., Siambón, November 1945, 1 ♀ (\*\*) (FML); San Miguel de Tucumán, 22 iv 1987, J. Muzón leg., 3 ♂ (MLP); Tucumán, 800 m, 18 ii 1959, J.F.G. Clarke leg., 1 ♂ (USNM); Tucumán, 1,200 m, 1902, Steinbach leg., 1 ♀ (MNB); Tacanas, San Pedro Colalao, January 1947, Arnau leg., 1 ♂ (FML); San Pedro de Colalao, 23 iii 1970, Fidalgo leg., 1 ♀ (FML); same locality but 12 iv 1970, Wuscovi leg., 1 ♀ (FML); Bonete, Va. Andrés, 1,900 m, 18 vi 1956, 1 ♂ (FML); Horco Molle, Tafí, 26 vi 1971, C. Porter leg., 1 ♂ (FML); Los Pinos, río del Nío, Burruyacu dept., 16 viii 1970, Fidalgo leg., 1 ♂ (FML); quebrada de Lules, 05 iii 1942, Weyrauch leg., 1 ♀ (FML).

*Redescription, as a supplement to Ris' original description*

**Head:** longitudinal stem of T-spot narrowly joined with the transverse arms (Fig. 9); frontal ridge sinuous; ocular groove with a black stripe widened at fronto clypeal groove level.

**Thorax:** Spots 2+3 or 2 absent; 4+5+6 or 5+6 separated from 4; 7+8 or 7 and 8 separated.

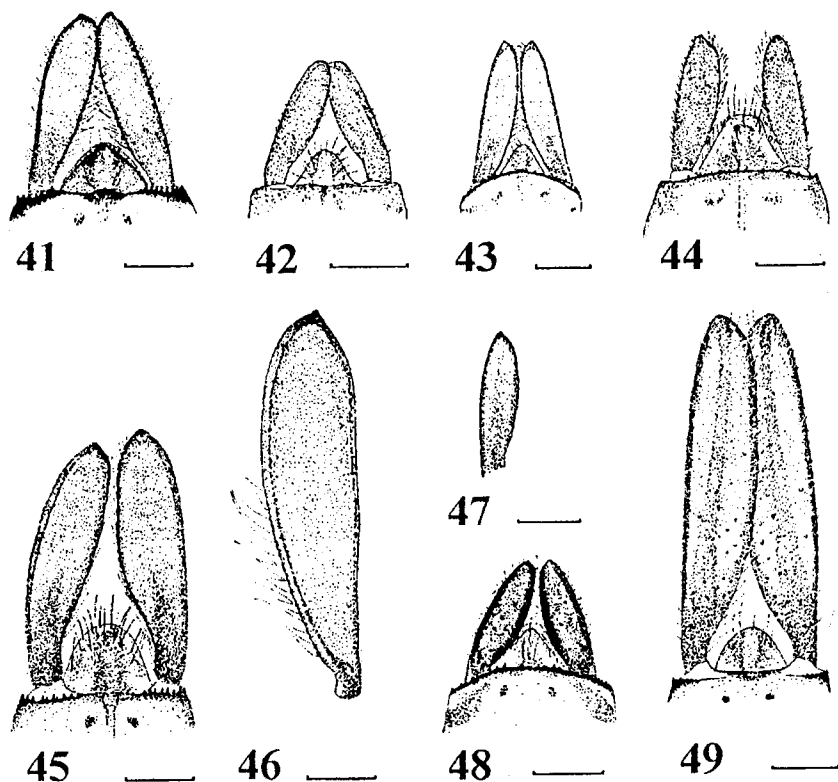
**Abdomen:** AL and AD separated in S3; PD' and PD separated in S4 and AL present in S7. Ventral terga S4-6 contour as shown in Figs 19 and 26. Apex of male cerci not marginal (Fig. 40); angle of sub-basal tooth straight; dorsal ridge at distal 0.30 (Fig. 33). Female cerci lanceolated, not mucronate; external margin straight, inner margin convex, maximum width between 0.50 and distal 0.30 (Fig. 49).

*Distribution*

Peru: Piura and Amazonas provinces; Bolivia: Cochabamba and Santa Cruz departments; Argentina: Jujuy, Salta, Catamarca, La Rioja and Tucumán provinces (Fig. 50).

*Remarks*

*A. vigintipunctata* is similar to *A. brevicercia* sp. nov. in male and female size and male cerci length. Ris' (1918) description of *A. vigintipunctata* female is based on a unique specimen from Huancabamba, Peru, without cerci. Since cerci size and shape are the



Figures 41-49. Female cerci, dorsal view – (41) *Aeshna (Marmaraeschna) brevicercia* sp. nov. allotype; (42) *A. (M.) brevifrons* allotype; (43) *A. (M.) brevifrons* same as Fig. 4; (44) *A. (M.) fissifrons* sp. nov. allotype; (45) *A. (M.) intricata* from Peru, Cajamarca, Celendin, 9 vi 1936; (46) left cercus, *A. (M.) obscura* sp. nov. allotype; (47) right cercus – *A. (M.) pallipes* holotype; (48) *A. (M.) pallipes* same as Fig. 8; (49) *A. (M.) vigintipunctata* from Bolivia, Santa Cruz, Ichilo, Buena Vista. Bars: 1 mm.

best way to separate females of these two species, we cannot be sure about the identity of the female studied by Ris. Nevertheless, if Ris' statement of head colour pattern is right, it would belong to *A. vigintipunctata*.

### *Biological notes*

Our experience with *Marmaraeschna* species in the field is confined to observations on *Aeshna (M.) fissifrons*, *A. pallipes* and *A. vigintipunctata*. All three species were found simultaneously in the same rocky mountain streams at Quebrada del Rio Colorado and San Antonio (Salta, Argentina); a specific behavioural discrimination in the field was not made. The adults were seen flying high (10–15 m) over the stream from 11:00 to 13:00 h, and close over the water along the stream from 13:00 to 16:00 h (local time); at this time

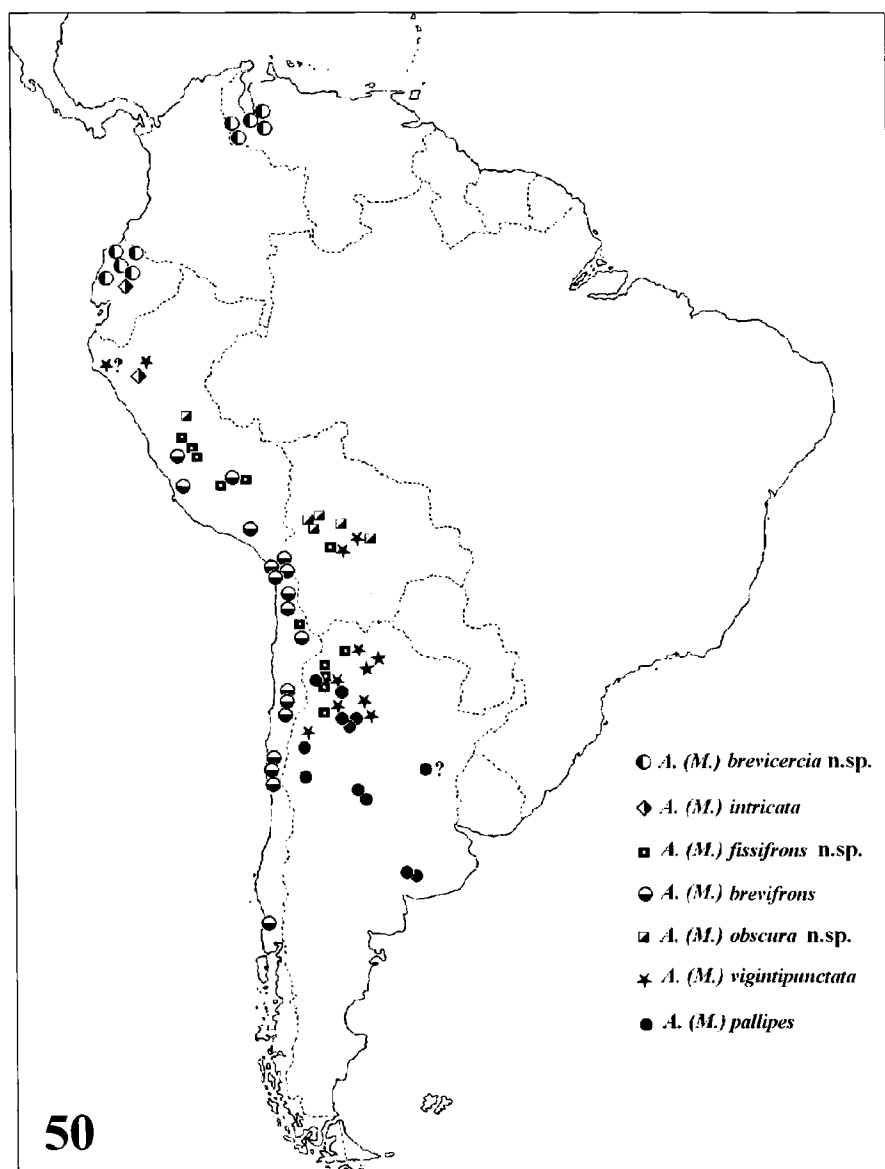


Figure 50. Map of South America showing geographic distribution of *Aeshna (Marmaraeschna)* species. ? = doubtful records.

flying tandems and oviposition were observed. Females oviposited on the vegetation of the stream margins. Guarding behavior of males over ovipositing females was not observed.

From time to time the adults perched on sunny rocks, where they disguised their contour with the background through their cryptic marbled color pattern. Larvae — unidentified at species level — were found under stones and submerged vegetation in the quieter sections of the stream. Females of *A. fissifrons* were also found at 3,900 m (ayo. Incahuasi, Salta, Argentina) flying and feeding along an Andean creek and seepages, but no larvae were found in these environments. *A. vigintipunctata* was also found flying close over the water patrolling rocky streams located in the yungas mountain forest (Aguada del Tigre, P.N. Calilegua, Jujuy; Quebrada de San Lorenzo and rio Yacones, Salta).

### Diagnostic key to the species of *Marmaraeschna*

1. Frontal ridge with a deep medial cleft in frontal view (Fig. 11) . . . . . *fissifrons*
- 1'. Frontal ridge straight in frontal view (Fig. 12) . . . . . *pallipes*
- 1''. Frontal ridge sinuous in frontal view (Fig. 10) . . . . . **2**
2. Sub-basal tooth and dorsal ridge of male cerci slightly developed (Figs 27, 28); apex of male cerci marginal (Figs 34, 35); female cerci not longer than 3 mm . . . . . **3**
- 2'. Sub-basal tooth and dorsal ridge of male cerci well developed (Figs 30-31, 33); apex of male cerci not marginal (Fig. 38); female cerci not shorter than 3.7 mm . . . . . **4**
3. Longitudinal stem of T-spot widely joined with its transverse arms (Fig. 3); male cerci length 5.4–5.9 mm; female cerci length 2.7 – 3 mm (Fig. 41) . . . . . *brevicercia*
- 3'. Longitudinal stem of T-spot narrowly joined with, or separated from, its transverse arms (Fig. 6); male cerci length 4.2-4.8 mm; female cerci length 1.9-2.3 mm (Figs 42-43) . . . . . *brevifrons*
4. Longitudinal stem of T-spot widely joined with its transverse arms (Fig. 7); female cerci widest at distal 0.25 of their length (Fig. 46) . . . . . *obscura*
- 4'. Longitudinal stem of T-spot narrowly joined with, or separated from, its transverse arms (Fig. 9); female cerci widest at medial 0.30 of their length (Figs 45, 49) . . . **5**
5. Angle of sub-basal tooth of male cerci obtuse, dorsal ridge developed at distal 0.20, cerci length 4.9-5.5 mm (Fig. 30); female cerci length 3.7 mm . . . . . *intricata*
- 5'. Angle of sub-basal tooth of male cerci straight, dorsal ridge developed at distal 0.30, cerci length 5.8-6.4 mm (Fig. 33); female cerci length 4.9-5.65 mm . . . . . *vigintipunctata*

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